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UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
EXA-104

Total Pages in this Submission

TO THE ASSISTANT COMMISSIONER FOR PATENTSBox Patent Application
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

PROCESS FOR MANUFACTURING A MOLDED PLASTIC WINDOW FOR AN AUTOMOTIVE VEHICLE AND WINDOW PRODUCED THEREBY

and invented by:

Mark M. Matsco, Michael E. Sykes and David KusumaIf a **CONTINUATION APPLICATION**, check appropriate box and supply the requisite information:☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Which is a:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Which is a:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Enclosed are:

Application Elements

1. ☐ Filing fee as calculated and transmitted as described below
2. ☒ Specification having 9 pages and including the following:
 - a. ☒ Descriptive Title of the Invention
 - b. ☒ Cross References to Related Applications (if applicable)
 - c. ☐ Statement Regarding Federally-sponsored Research/Development (if applicable)
 - d. ☐ Reference to Microfiche Appendix (if applicable)
 - e. ☒ Background of the Invention
 - f. ☒ Brief Summary of the Invention
 - g. ☒ Brief Description of the Drawings (if drawings filed)
 - h. ☒ Detailed Description
 - i. ☒ Claim(s) as Classified Below
 - j. ☒ Abstract of the Disclosure

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Application Elements (Continued)

3. ☒ Drawing(s) *(when necessary as prescribed by 35 USC 113)*
- a. ☐ Formal Number of Sheets _____
- b. ☒ Informal Number of Sheets 2
4. ☒ Oath or Declaration
- a. ☐ Newly executed *(original or copy)* ☒ Unexecuted
- b. ☐ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*
- c. ☒ With Power of Attorney ☐ Without Power of Attorney
- d. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application,
see 37 C.F.R. 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference *(usable if Box 4b is checked)*
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☐ Computer Program in Microfiche *(Appendix)*
7. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all must be included)*
- a. ☐ Paper Copy
- b. ☐ Computer Readable Copy *(identical to computer copy)*
- c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. ☐ Assignment Papers *(cover sheet & document(s))*
9. ☐ 37 CFR 3.73(B) Statement *(when there is an assignee)*
10. ☐ English Translation Document *(if applicable)*
11. ☐ Information Disclosure Statement/PTO-1449 ☐ Copies of IDS Citations
12. ☐ Preliminary Amendment
13. ☒ Acknowledgment postcard
14. ☒ Certificate of Mailing
- ☐ First Class ☒ Express Mail *(Specify Label No.):* EL226871155US

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Accompanying Application Parts (Continued)

15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*

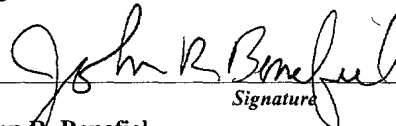
16. ☐ Additional Enclosures *(please identify below):*

Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	12	- 20 =	0	x \$18.00	\$0.00
Indep. Claims	1	- 3 =	0	x \$79.00	\$0.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
BASIC FEE					\$690.00
OTHER FEE (specify purpose)					\$0.00
TOTAL FILING FEE					\$690.00

- ☐ A check in the amount of _____ to cover the filing fee is enclosed.
- ☐ The Commissioner is hereby authorized to charge and credit Deposit Account No. _____ as described below. A duplicate copy of this sheet is enclosed.
- ☐ Charge the amount of _____ as filing fee.
 - ☐ Credit any overpayment.
 - ☐ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
 - ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).


Signature

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Dated: June 16, 2000

CC:

1 **PROCESS FOR MANUFACTURING A MOLDED**
2 **PLASTIC WINDOW FOR AN AUTOMOTIVE VEHICLE AND**
3 **WINDOW PRODUCED THEREBY**
4

5 Cross Reference to Related Applications
6

7 This application claims the benefit of the filing date of provisional application
8 60/140,422, filed on June 22, 1999.
9

10 Background of the Invention

11 This invention concerns glazing particularly for automotive window panels. It
12 has long been proposed to construct windows for automotive vehicles from synthetic resins, i.e.,
13 from plastic material. A suitable such material is polycarbonate, and use of this material of
14 automotive windows has long been proposed. By hardcoating the surfaces by processes
15 heretofore developed, sufficient scratch resistance can be achieved to produce automotive
16 window panels performing well in service. Other coatings are also now available, such as UV
17 blocking coatings to further improve the performance of plastic windows for automotive
18 vehicles.

19 Molded plastic automotive windows offer a number of advantages over
20 conventional glass glazing, including a significant reduction in vehicle weight and improved
21 vehicle safety, as the polycarbonate panels better resist shattering as compared to glass, and in a
22 crash fixed plastic windows keep the occupants from being ejected from the vehicle passenger
23 compartment better than existing glass windows. Greater design freedom is afforded by plastic
24 windows due to the ease in forming complex curved shapes.

25 One problem with polycarbonate panels used for automotive windows is a lack of
26 edge stiffness, important for moving or "drop" windows. The edges of such plastic panels are

1 insufficiently stiff to reliably maintain registry with the window guides and seals, and can be
2 pushed out by impact of an occupant with the window in a crash.

3 A requirement for existing fixed windows is a masking border to conceal the body
4 and seal structure at the jointer of the window periphery to the body, which masking border
5 requirement adds processing steps in manufacturing such window panels.

6 U.S. patents nos. 5,339,584 and 5,035,096 both propose certain techniques in
7 manufacturing synthetic resin windows for automotive vehicles in order to overcome the lack of
8 stiffness in a molded plastic window panel.

9 U.S. patent 5,339,584 describes an insert molding technique for attaching a
10 reinforced frame to an optical main glazing panel.

11 U.S. patent 5,035,096 describes producing a hollow frame portion extending
12 about the perimeter of the main panel, the frame hollow portion formed by a gas assist technique,
13 in which gas is injected into a cavity defining the frame portion, the gas expanding within the
14 plastic to create the hollow shape of the frame portion.

15 In this approach, the hollow frame is molded as one piece with the optical panel
16 and is thus formed from the same resin material, to be integrally molded therewith. In order to
17 provide the masking border treatment, an extra painting or coating process is required. The
18 hollow frame is an efficient way of achieving adequate perimeter stiffness, but there are several
19 problems with the approach described in that patent.

20 Firstly, optical flaws are sometimes produced by the assist gas migrating into the
21 main mold cavity where the main panel is formed. Also, stress riser cavities could be formed by
22 such migrating gas. Other slight optical flaws can occur because of the two cavities inducing
23 residual stresses in the optical portion.

1 The resin used in the optical panel does not itself form a particularly stiff material,
2 and the use of the same material in the frame portion thus compromises the rigidity which could
3 otherwise be achieved.

4 It is the object of the present invention to provide a manufacturing process for
5 providing a hollow frame on the perimeter of a molded plastic main glazing panel which
6 minimizes optical flaws in the main glazing panel.

7 It is a further object to provide such process in which the panel rigidity can be
8 maximized by allowing the use of a different stiffer material in the frame portion.

9 Yet another object is to provide a process for manufacturing a glazing panel
10 having a hollow perimeter frame which can eliminate other processing steps.

11 Still another object is to provide such process which allows many processing
12 options to enhance manufacturing efficiency.

13 14 Summary of the Invention

15 These and other objects which can be appreciated by a reading of the following
16 specification and claims are achieved by utilizing a two shot process, in which the optical main
17 glazing panel is separately molded from the hollow frame portion, the hollow frame portion
18 formed by a conventional gas assist process.

19 The two shot molding process can be achieved by various options including
20 overmolding (using movable cores, with either the frame or main molded panel first, using a
21 second nozzle, for example), transfer molding, in which a separate mold is used for each part, or
22 insert molding in which one or the other part is molded first, and inserted in a mold for the
23 second part.

1 Separate molding of the main panel and the hollow frame portion eliminates many
2 of the optical flaws resulting from gas migration, residual stresses and sink marks.

3 Separate molding also allows different draft angles for the hollow frame portion.

4 The frame portion may be molded from a stiffer material such as a filled resin to
5 maximize the rigidity of the frame portion to maximize the rigidity of the window edge.

6 The frame portion material can also be rendered opaque to provide border
7 masking without the need for a separate coating or painting step, or to necessitate the a difficult
8 insert film molding step described in the above referenced patents.

9 Simplification of the complete window manufacturing process is also possible
10 with the two shot molding approach, i.e., reinforcing ribs, latching and hinging features can be
11 more easily molded into the frame portion to eliminate attachment of separate parts.

12 13 Description of the Drawing Figures

14 Figure 1 is a fragmentary perspective view of a molded plastic window panel
15 made by a process according to the present invention.

16 Figure 2 is a transverse sectional view of the window panel shown in Figure 1.

17 Figure 3 is a sectional view of a second embodiment of a window panel according
18 to the invention.

19 Figure 4 is a fragmentary perspective view of a third embodiment of a window
20 panel according to the present invention.

Detailed Description

In the following detailed description, certain specific terminology will be employed for the sake of clarity and a particular embodiment described in accordance with the requirements of 35 USC 112, but it is to be understood that the same is not intended to be limiting and should not be so construed inasmuch as the invention is capable of taking many forms and variations within the scope of the appended claims.

Referring to the drawings, and particularly Figures 1 and 2, a portion of a molded plastic automotive window 10 is shown, which includes a main glazing panel 12 optically undistorted, and a hollow frame portion 14 extending about the perimeter of the main panel 12. The main glazing panel 12 is injection molded from a suitable synthetic resin such as polycarbonate as a first shot, producing a generally planar panel, although typically having some degree of curvature as desired for a particular application.

The hollow frame portion 14 is injection molded in a second shot, using gas assist techniques to produce a cavity 16 creating the hollow cross section of the frame portion 14.

The hollow frame portion 14 has a wall 18 having one side contiguous to and overlying the inside surface 20 of the main panel 12. The material used to mold the frame portion 14 is preferably of a stiffer modulus such as a filled polycarbonate or another resin which is compatible so as to form a melt bond between the contiguous surfaces. The resin material can be blackened as by the addition of lamp black, or rendered opaque in some other way such that the frame portion 14 itself provides the masking border treatment for the perimeter of the window 10..

The two shot molding steps can be carried out in various alternative ways, i.e., using a common mold with movable inserts or separate molds using the first molded part as an

1 insert. Gas assist injection mold components must also be incorporated in the mold. Since these
2 techniques and mold design features are well known in the field, such mold details are not here
3 described in detail.

4 Main panels 12 produced by the method of the present invention are usually free
5 of the optical flaws described above, while providing a substantially enhanced edge stiffness of
6 the complete window 10.

7 Figure 3 shows another form of connection between a main panel 12A and a
8 hollow frame portion 14A, in which an inwardly projecting rib 22 has an angled edge 24 which
9 abuts a perimeter edge 26 of the main panel 12A, bonded along the interface so formed.

10 The hollow frame portion 14A also has an integral outwardly projecting rib 28
11 offset out of the plane of the main panel 12A. The rib 28 can be used to retain the window 10A
12 in a body structure mounted window guides (not shown), securing the window in position
13 against a weather seal (not shown) and preventing the window 10A from being too easily pushed
14 out of the window opening.

15 The offset "d" is advantageous in that the outer surface of the main panel 12A can
16 now lie in approximately the same plane as the body sheet metal for improved styling.

17 Figure 4 illustrates a window 10B in which the frame portion 14B has integral
18 attachment features 30 molded with the frame portion 14B.

19 Other features such as hinges, bosses, locators can easily be integrally molded at
20 the same time since the frame portion 14B is molded separately from the main panel 12B.

1 Claims:

2
3 1. A method of manufacturing a window for an automotive vehicle
4 comprising the steps of:

5 molding a main panel from a transparent synthetic resin, substantially free from
6 optical distortion;

7 separately molding a frame portion from a synthetic resin, including the step of
8 inducing gas assist expansion of the frame portion to form a hollow cavity extending along said
9 frame portion, said frame portion configured to be fit to an outer perimeter of said main panel;
10 and

11 joining said frame portion to said main panel perimeter.
12

13 2. The method according to claim 1 wherein in said joining step, said frame
14 portion is melt bonded to said main panel by inserting one of either said main panel or said frame
15 portion in a mold in which the other of said main panel or said frame portion is molded.
16

17 3. The method according to claim 1 further including the step of forming an
18 outwardly projecting rib in said frame portion offset from the plane of said main panel.
19

20 4. The method according to claim 1 further including the step of molding
21 said frame portion from an opaque material to cause said frame portion to define a masking
22 border extending about the perimeter of said main panel.
23

1 5. The method according to claim 1 wherein said frame portion is molded
2 from a synthetic resin of a stiffness greater than the synthetic resin from which said main panel is
3 molded.

4
5 6. The method according to claim 1 wherein said main panel is molded from
6 polycarbonate resin.

7
8 7. The window made by the method of claim 1.

9
10 8. The window made by the method of claim 2.

11
12 9. The window made by the method of claim 3.

13
14 10. The window made by the method of claim 4.

15
16 11. The window made by the method of claim 5.

17
18 12. The window made by the method of claim 6.

1 **PROCESS FOR MANUFACTURING A MOLDED**
2 **PLASTIC WINDOW FOR AN AUTOMOTIVE VEHICLE AND**
3 **WINDOW PRODUCED THEREBY**
4

5 **Abstract of the Disclosure**

6 A method of manufacturing a plastic window for an automotive vehicle in which
7 a hollow frame portion is separately molded from a main optical panel the frame portion bonded
8 to the perimeter of the main panel as by melt bonding.
9

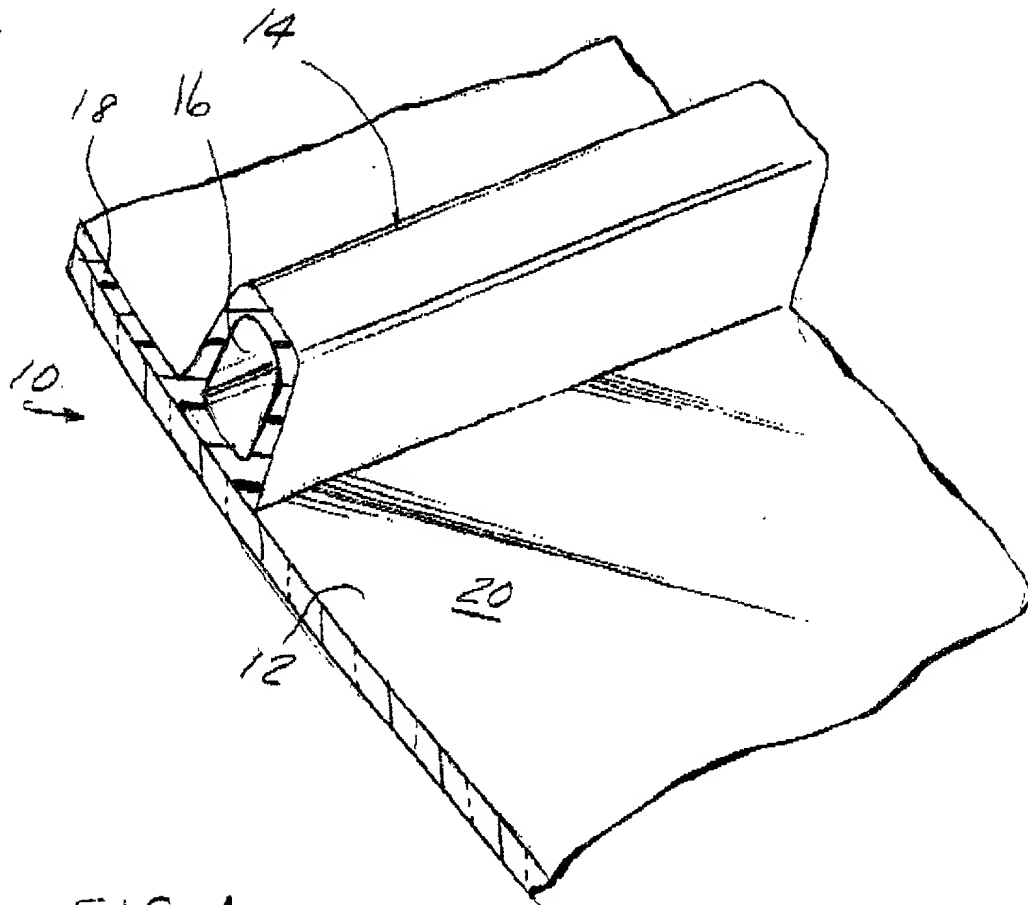


FIG. 1

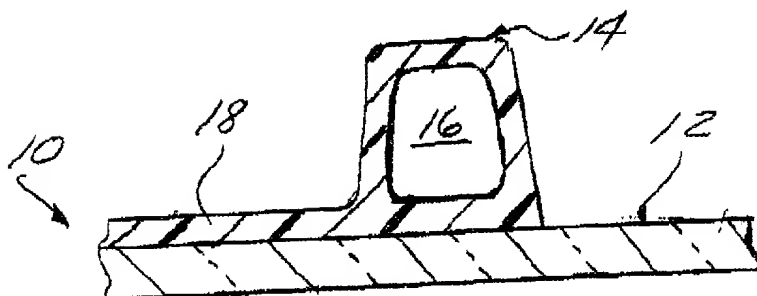


FIG. 2

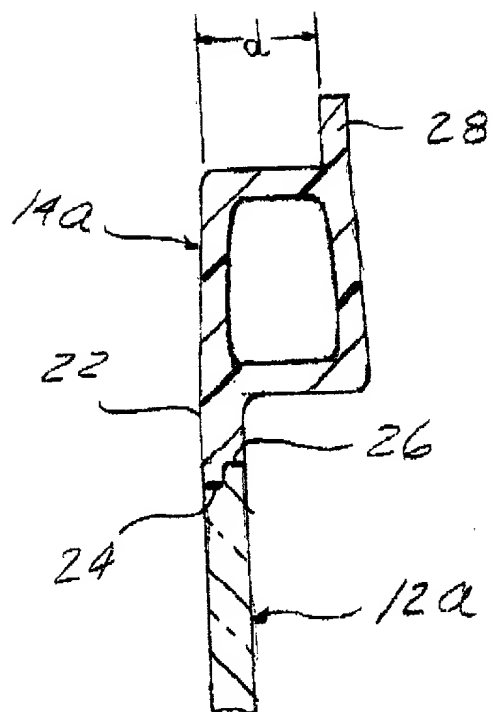


FIG. 3

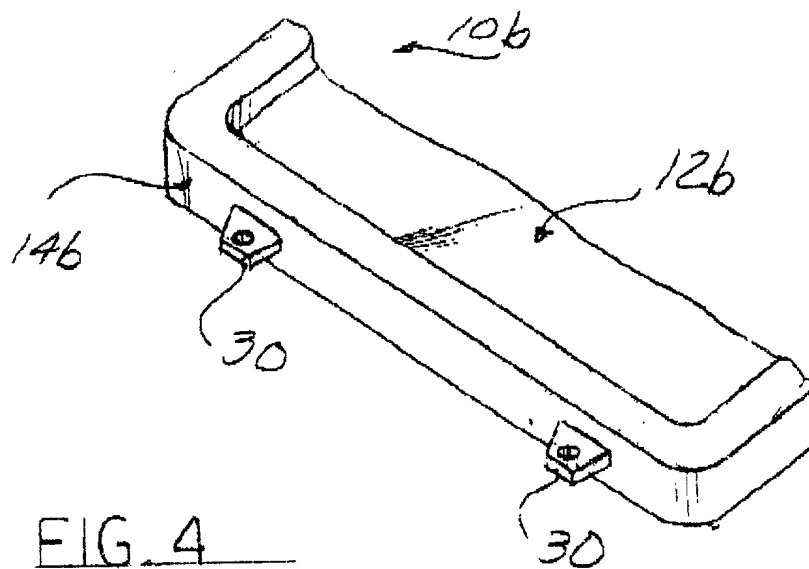


FIG. 4

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that: My residence, post office address, and citizenship are as stated below next to my name; and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

PROCESS FOR MANUFACTURING A MOLDED PLASTIC WINDOW FOR AN AUTOMOTIVE VEHICLE AND WINDOW PRODUCED THEREBY

The specification of which

☒ is attached hereto

☐ was filed on _____, as Application Serial No. _____.

☐ and was amended on or through _____.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below:

<u>60/140,422</u>	<u>June 22, 1999</u>
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, 112, I acknowledge the duty of disclose material information as defined in Title 37, Code of Federal Regulations, 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of the application.

NONE

(application serial no.)	(filing date)	(status)
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And I hereby appoint John R. Benefiel, Patent Office Registration No. 24,889, as my attorney, to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith. Send all correspondence to: John R. Benefiel, 280 Daines Street, Suite 100 B, Birmingham, Michigan 48009, Telephone No. (248) 644-1455.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these

statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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